

REMARKS

Favorable reconsideration of this application is respectfully requested in view of the following remarks.

As a preliminary matter, the Examiner is thanked for returning the form PTO-1449 that was submitted with the Information Disclosure Statement dated June 16, 2004. It was indicated on the PTO form 1449 that a number of foreign references were not considered. As indicated in the Information Disclosure Statement, copies of these references were not submitted therewith because they were previously made of record in prior Application No. 10/117,993 that was filed on April 9, 2002, upon which Applicants rely for the benefits provided in 35 U.S.C. § 120. Accordingly, Applicants are under no obligation to submit copies of these references. However, to assist the Examiner, copies of GB 2220595, JP 04322850, JP 2000154850, EP 1110644 and JP 2002340140 are attached hereto, along with a form PTO-1449 listing such. It is requested that an initialed copy of this form PTO-1449 be returned, thereby indicating that the references have been considered.

Claim 19 is newly added by way of this amendment. Thus, Claims 15-19 are currently pending in this application, with Claim 15 being the only independent claim.

Claim 15 is directed toward a method of manufacturing a rigid internal gear of a wave gear device having a combination of features including a main gear ring and a tooth-forming ring having internal teeth formed on an inner circumferential surface thereof. The method includes, adding knurls to an outer circumferential surface of the tooth-forming ring and carving, from the tops of the knurls, at least one cutting edge that extends in a circumferential direction, and pressing the tooth-forming ring into an inside of the main gear ring while having at least one cutting edge formed on

the outer circumferential surface of the tooth-forming ring cut an inner circumferential surface of the main gear ring so as to integrate the main gear ring and the tooth-forming ring.

The Official Action rejects Claim 15 under 35 U.S.C. § 103(a) as being unpatentable over Applicants' Admitted Prior Art, hereinafter *AAPA*, in view of U.S. Patent No. 2,147,343, hereinafter *Hokanson*.

AAPA describes a known configuration of a wave gear device that includes a circular rigid internal gear, a cup-shaped flexible external gear that is disposed inside the rigid internal gear, and a wave generator fitted into the flexible external gear. It is necessary for the joint between the main gear ring and the tooth-forming ring to transmit a large amount of torque, so the joint is dependably secured using fixings such as bolts.

Hokanson is directed to friction joints of a drill. The principal object resides in improving frictional contact of a joint by knurling, serrating, or otherwise roughening either or both of the friction surfaces of the cooperative parts. As seen in Fig. 1 of *Hokanson*, a drill has a rod 1 and a bit 20, each having a knurled or serrated tapered surface 4. A cutting head 2 of the drill includes tapered sockets 3, 9 into which the rod 1 and the bit 20 are inserted. The rod 1, the bit 20 and the outside of the cutting head 2 are hardened, while the inside of the cutting head 2 remains soft. The surfaces 4 may have numerous configurations, such as vertical serrations or opposing diagonal grooves. See page 2, lines 29-39, left column. During use, the rod 1 and the bit 20 are forcefully inserted into the respective tapered sockets 3, 9, wherein the surface 4 becomes embedded in the soft inside of the cutting head 2. Beginning on page two, right column, line 3, it is described that in Fig. 10, when the

very small tooth-like serrations formed on the harder male portion 17 of the joint are forced in the axial direction into the softer material of the female member 18, a considerable portion of the softer material is forced into a space intermediate of the tooth-like serrations.

Claim 15 is allowable at least because there would have been no motivation to combine AAPA in view of *Hokanson* as suggested in the Official Action. AAPA is concerned with a wave gear device having a main ring and a tooth-forming ring, wherein the tooth-forming ring and the main ring are connected via bolts so as to transmit torque between the main ring and the tooth forming ring. In contrast, *Hokanson* involves a drill, where during operation both torque and axial forces are transmitted between the bit 20 and the cutting head 2. *Hokanson* describes in the paragraph bridging pages 1 and 2 (emphasis added) that “the matter of utmost importance in a friction joint is to prevent movement longitudinally between the friction surfaces.” Clearly, an important aspect of the invention described in *Hokanson* involves axial force produced by the axial pressing force present during drilling. It would have been apparent to a skilled person that this axial force serves to create friction between the friction surfaces, that the bit 20 would not be held securely in the radial direction absent the axial force produced by drilling. For at least this reason, it would not have been obvious for a skilled person to modify the wave gear of AAPA to include the drill friction joint shown in *Hokanson* because the wave gear in AAPA does not involve axial forces like those in *Hokanson*. Therefore, the skilled person would not have expected the friction joint described in *Hokanson* to be successfully applied to AAPA.

Claim 15 is also allowable at least because it defines a combination of steps including adding knurls to an outer circumferential surface of the tooth-forming ring and carving, from tops of the knurls, at least one cutting edge that extends in a circumferential direction. This feature is not taught or suggested in either *AAPA* or *Hokanson*. Specifically, in *Hokanson* the formation of knurls is described, but not the added feature directed toward carving, from the tops of the knurls, at least one cutting edge, and in particular, a cutting edge extending in a circumferential direction. Because neither reference teaches or suggest a combination of features including carving at least one cutting edge form the tops of knurls, the references alone or in combination do not teach or suggest every feature defined by Claim 15.

Claim 15 is also allowable at least because it defines a combination of steps including pressing the tooth-forming ring into an inside of the main gear ring while having at least one cutting edge formed on the outer circumferential surface of the tooth-forming ring cut an inner circumferential surface of the main gear ring so as to integrate the main gear ring and the tooth-forming ring. In other words, the subject matter of Claim 15 makes use of a cutting operation of the cutting edges to enhance the integrity of the two rings.

In contrast, in *AAPA* the tooth forming ring is forced into the main ring and secured by bolts, and does not involve cutting the inner circumferential surface of the tooth-forming ring. In *Hokanson*, the softer inside of the cutting head 2 is plastically deformed by the surface 4 of the rod 1 and the bit 20, wherein the soft inside material moves into the spaces on the surface 4. The cited references rely on the deformation of the softer material to increase the integrity of the softer and harder

materials, which is different from the subject matter directed toward cutting that is defined by Claim 15.

Claims 16-19 depend from Claim 15, and are therefore allowable for at least the same reasons applied to Claim 15.

Also, Claim 17 is allowable at least because it is directed toward a gear cutting process for forming the internal teeth on the tooth-forming ring being performed after the tooth-forming ring is integrated with the main gear ring. The AAPA makes no mention of how the gear is formed, and *Hokanson* is not directed to formation of a wave gear. Therefore, neither reference teaches or suggests forming internal teeth on a tooth-forming ring being performed after the tooth-forming ring is integrated with a main gear ring.

New Claim 19 is allowable at least because it is directed toward a knurl that is formed with a pitch of 0.5 to 1.6 mm, and an interference for the pressing is between 0.03 and 0.3 mm. The cited references do not teach or suggest this combination of features.

For at least these reason, it is requested that all the rejections be withdrawn and that this application be allowed.

In the event that there are any questions relating to this Amendment, or the application in general, it would be appreciated if the Examiner would telephone the undersigned attorney concerning such questions so that the prosecution of this application may be expedited.

Respectfully submitted,

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